

CLAIMS

1. A beamforming system adapted for use with an array antenna having a plurality of antenna elements, said beamforming system comprising:

first means for transforming a signal received by said antenna into a plurality of frequency subbands;

second means for performing adaptive array processing on each of said subbands and providing a plurality of adaptively processed subbands in response thereto; and

third means for normalizing said adaptively processed subbands.

2. The invention of Claim 1 wherein said first means includes means for performing a Fast Fourier Transform on said received signal.

3. The invention of Claim 2 wherein said first means includes a radio frequency receiver.

4. The invention of Claim 3 wherein said first means includes an analog-to-digital converter coupled to the output of said radio frequency receiver and adapted to provide a plurality of samples in response to receipt of said signal.

5. The invention of Claim 4 wherein said first means includes means for forming blocks of said samples.

6. The invention of Claim 5 wherein said first means further includes means for amplitude weighting said sample blocks to provide a windowing function with respect thereto.

7. The invention of Claim 6 wherein said first means further includes a bandpass filter adapted to filter the output of said means for performing a Fast Fourier Transform on said received signal.

8. The invention of Claim 2 further including means for performing an inverse Fast Fourier Transform on said received signal.

9. The invention of Claim 1 wherein said second means includes an adaptive array processor for each frequency subband.

10. The invention of Claim 9 wherein each of said adaptive array processors includes means for applying a weight to a respective frequency subband for each of said elements of said array.

11. The invention of Claim 10 wherein said weights are chosen to steer a beam in a direction of a desired signal.

12. The invention of Claim 11 wherein each of said adaptive array processors further includes means for combining the outputs of said means for applying a weight to a respective frequency subband for each of said elements of said array to provide a single output signal for each subband.

13. The invention of Claim 12 wherein said third means includes means for adjusting the amplitude of one or more of said subbands.

14. A beamforming system adapted for use with a GPS receiver and an array antenna having a plurality of antenna elements, said beamforming system comprising:

an FFT transforming a signal received by said antenna into a plurality of frequency subbands;

an adaptive array processor arrangement for processing on each of said subbands and providing a plurality of adaptively processed subbands in response thereto, said arrangement including an adaptive array processor for each frequency subband, each of said adaptive array processors including means for applying a weight to a respective frequency subband for each of said elements of said array, said weights being chosen to steer a beam in a direction of a desired signal; and

a processor for adjusting the amplitude of one or more of said subbands.

15. The invention of Claim 14 wherein each of said adaptive array processors further includes means for combining the outputs of said means for applying a weight to a respective frequency subband for each of said elements of said array to provide a single output signal for each subband.
16. The invention of Claim 14 wherein said first means includes means for performing a Fast Fourier Transform on said received signal.
17. The invention of Claim 16 wherein said first means includes a radio frequency receiver.
18. The invention of Claim 17 wherein said first means includes an analog-to-digital converter coupled to the output of said radio frequency receiver and adapted to provide a plurality of samples in response to receipt of said signal.
19. The invention of Claim 18 wherein said first means includes means for forming blocks of said samples.
20. The invention of Claim 19 wherein said first means further includes means for amplitude weighting said sample blocks to provide a windowing function with respect thereto.
21. The invention of Claim 20 The invention of Claim wherein said first means further includes a bandpass filter adapted to filter the output of said means for means for performing a Fast Fourier Transform on said received signal.
22. The invention of Claim 16 further including means for performing an inverse Fast Fourier Transform on said received signal.

23. A beamforming method adapted for use with an array antenna having a plurality of antenna elements, said beamforming method including the steps of:

transforming a signal received by said antenna into a plurality of frequency subbands;

performing adaptive array processing on each of said subbands and providing a plurality of adaptively processed subbands in response thereto; and

normalizing said adaptively processed subbands.

24. The invention of Claim 23 wherein said signal is a GPS signal.

25. The invention of Claim 23 wherein said step of performing adaptive array processing further includes the step of applying a weight to a respective frequency subband for each of said elements of said array.

26. The invention of Claim 25 further including the step of choosing said weights to steer a beam in a direction of a desired signal.

27. The invention of Claim 26 further including the step of combining the outputs of said step of applying a weight to a respective frequency subband for each of said elements of said array to provide a single output signal for each subband.

28. The invention of Claim 23 wherein said step of normalizing further includes the step of adjusting the amplitude of one or more of said subbands.